

## **Amendments to the Claims**

Claims 1-3. (Cancelled)

4. (New) A method for coating a workpiece, wherein a material is applied to the workpiece by thermal spray coating, and wherein the thermal spray coating process is monitored on-line by detecting properties of particles in a spray jet and supplying the properties as actual values, wherein the actual values are compared directly with target values, or wherein characteristic quantities derived from the actual values are compared with the target values, and wherein, when there is a deviation between the actual values or the characteristic quantities and pre-specified target values, process parameters for the thermal spray coating are adjusted automatically by a regulator based on at least one neuronal network, wherein the regulator is a neuro-fuzzy regulator combining the at least one neuronal network and fuzzy logic rules and thus mapping statistical relationships between input variables and output variables of the neuro-fuzzy regulator.
5. (New) The method according to Claim 4, wherein the properties detected for the spray jet include particle temperature and/or particle velocity and/or particle size and/or a luminous intensity of the particles.
6. (New) The method according to Claim 4, wherein the neuronal network comprises at least four layers each having multiple neurons, wherein the neurons of an input layer map a fuzzification, the neurons of an output layer map a defuzzification, and the neurons of the layers arranged between the input layer and the output layer map a fuzzy inference.
7. (New) A method for coating a workpiece, comprising the steps of:  
applying a material to the workpiece by a thermal spray coating process;  
monitoring the thermal spray coating process by detecting an actual value of a property of a particle in a spray jet of the thermal spray coating process;  
comparing the actual value with a target value for the property; and

automatically adjusting a process parameter for the thermal spray coating process by a neuro-fuzzy regulator when there is a deviation between the actual value and the target value for the property based on a neuronal network with fuzzy logic rules, wherein the neuronal network maps a relationship between an input variable and an output variable of the neuro-fuzzy regulator.

8. (New) The method according to Claim 7, wherein the step of comparing the actual value with the target value for the property includes deriving a characteristic quantity for the property from the actual value and comparing the characteristic quantity with the target value.

9. (New) The method according to Claim 7, wherein the thermal spray coating process is a plasma spray process.

10. (New) The method according to Claim 7, wherein the property is a temperature of the particle.

11. (New) The method according to Claim 7, wherein the property is velocity of the particle.

12. (New) The method according to Claim 7, wherein the property is a size of the particle.

13. (New) The method according to Claim 7, wherein the property is a luminous intensity of the particle.

14. (New) The method according to Claim 7, wherein the neuronal network comprises at least four layers, wherein neurons of an input layer map a fuzzification, neurons of an output layer map a defuzzification, and neurons of layers arranged between the input layer and the output layer map a fuzzy inference.

15. (New) The method according to Claim 7, wherein the step of mapping a relationship between an input variable and an output variable of the neuro-fuzzy regulator includes the steps of:

converting the input variable into a fuzzy variable by a first layer of the neuronal network;

processing the fuzzy variable by a second layer of the neuronal network;  
and

converting the processed fuzzy variable into the output variable by a third layer of the neuronal network.

16. (New) The method according to Claim 15, wherein the step of processing the fuzzy variable by the second layer of the neuronal network includes the step of processing by linguistic rules and fuzzy operators.

17. (New) An apparatus for coating a workpiece, comprising:

a neuron-fuzzy regulator, including a neuronal network with fuzzy logic rules, for a thermal spraying process;

a camera for monitoring a spray jet of the thermal spraying process; and  
an image processing system, wherein an actual value of a property of a particle in the spray jet is determined by the image processing system from an image of the spray jet obtained from the camera;

wherein a process parameter for the thermal spraying process is automatically adjusted by the neuro-fuzzy regulator when there is a deviation between the actual value and a target value for the property, based on the neuronal network mapping a relationship between an input variable and an output variable of the neuro-fuzzy regulator.

18. (New) The apparatus according to Claim 17, wherein the spray jet is a plasma spray.

19. (New) The apparatus according to Claim 17, wherein the neuronal network comprises at least four layers, wherein neurons of an input layer map a fuzzification, neurons of an output layer map a defuzzification, and neurons of layers arranged between the input layer and the output layer map a fuzzy inference.

20. (New) The apparatus according to Claim 17, wherein the neuronal network includes:

a first layer, wherein the first layer converts the input variable into a fuzzy variable;

a second layer, wherein the second layer processes the fuzzy variable; and

a third layer, wherein the third layer converts the processed fuzzy variable into the output variable.

21. (New) The method according to Claim 20, wherein the step of processing the fuzzy variable by the second layer of the neuronal network includes the step of processing by linguistic rules and fuzzy operators.